PART I: EXECUTIVE SUMMARY/OVERVIEW

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Background

Vermont has approximately 7,100 miles of rivers and streams, 300,000 acres of fresh water wetlands and 810 lakes and ponds (those at least 5 acres in size or those named on USGS maps) totaling 230,789 acres. Surface waters (not including wetlands) are classified as Class A or Class B with an overlay Waste Management Zone in Class B waters for public protection below sanitary wastewater discharges. Class A waters are managed for enjoyment of water in its natural condition, as public drinking water supplies (with disinfection when necessary) or as high quality waters which have significant ecological values.

There are approximately 165 miles of Class A rivers and streams and 1,736 acres of Class A lakes and ponds in Vermont (these figures do not include rivers/streams above 2,500 feet elevation which are also Class A). In addition, there are close to 6,935 miles of Class B rivers and streams and 229,053 acres of Class B lakes and ponds. Approximately 315 miles of the Class B rivers and streams and 15 acres of lakes and ponds have a Waste Management Zone overlay.

The Vermont portion of the Batten Kill, the West Branch of the Batten Kill, the Lower Poultney River, a segment of the Ompompanoosuc River and a segment involving Pikes Falls on the North Branch of Ball Mountain Brook have each been designated by the Vermont Water Resources Board as Outstanding Resource Waters.

Overall Description of Vermont's Water Quality

The water quality of all Vermont's rivers and streams and lakes and ponds is considered good. This overall water quality rating has not changed from that which was reported in the 2000 305b Report. The federal EPA has requested states to also assess the state's water quality considering the fish consumption advisory for mercury which was issued in June 1995 and most recently revised in June 2000. The advisory was issued as the result of fish tissue sampling which showed mercury in the tissue of all fish, particularly in walleye and lake trout, and also PCBs in lake trout[1] in Lake Champlain (see updated advisory as Appendix B). Taking the advisory into consideration, the overall water quality of all the state's waterbodies would be rated as fair.

With regard to Vermont's wetlands, their water quality is believed to be generally good. Since Vermont does not have a specific program of assessing and monitoring wetland water quality, this characterization is somewhat speculative. It has been incumbent upon the state's limited resources to insure important wetland functions and values are protected from being lost to development or other destructive practices.

[1] Still in effect is the 1989 advisory for PCBs (polychlorinated biphenyls) in Lake Champlain.

No comprehensive studies have been completed on the quality of Vermont's ground water; however, the quality is considered to be excellent as there are very few reports of contaminated ground water public water supplies.

Water Pollution Control Program

GENERAL

Watershed Approach - Vermont has adopted a watershed approach to surface water quality planning. The DEC-prepared document, *Guidelines for Watershed Planning,* calls for basin surface water plans to be developed on a periodic basis. This document has been summarized and is included as Appendix C. For an update on progress of activities in the three river basins where water quality management plans are being developed, the reader should also refer to Appendix C.

Water Quality Standards - The Water Quality Standards are the foundation of the state's water pollution control and water quality protection efforts. Vermont's present Water Quality Standards were adopted June 10, 1999 and contain a few changes from those that were in use when the 2000 305b Report was prepared. One change to the Standards included a specific reference to a riparian policy. Another change has to do with the "typing" of waters under the Class A and Class B classification system. These revised Vermont Water Quality Standards became effective on July 2, 2000.

POINT SOURCE CONTROL PROGRAM

Approximately $41 million dollars were spent during the 2000 - 2001 reporting period on waste water treatment facility upgrades, combined sewer overflow corrections, sewer line extensions and rehabilitations and other waste water treatment system improvements in 15 municipalities.

NONPOINT SOURCE CONTROL PROGRAM

Overview - Vermont was one of the first states in the country to have an EPA-approved Nonpoint Source Management Program (March, 1989). Since its inception in 1990, Vermont has received over $8 million in Clean Water Act Section 319 Nonpoint Source (NPS) funds to implement a variety of activities directed at high priority waterbodies. The goal of the NPS management program is to encourage the successful implementation of best management practices (BMPs) by farmers, developers, municipalities, lakeshore residents, landowners and riparian landowners to prevent or reduce the runoff of pollutants. During the previous 305b reporting period, the New England regional office of US EPA approved the Upgrade for an Enhanced Vermont Nonpoint Source Management Program.

Some notable activities carried out with Section 319 funding during this 305b reporting period include completion of a 7-year agricultural BMP evaluation and development project, youth-based watershed restoration efforts, further water quality characterization for remediation of an abandoned copper mine, locally-led efforts to improve water quality for the Middlebury River and on certain tributaries to the West River and cooperative funding assistance from the Partnership Program for the Better Backroads Program to protect surface waters near town roads.

Section 604b Program - Work under the 604b Program continued during the reporting period with the award of Clean Water Act funds to the twelve Regional Planning Commissions to determine the nature, extent and causes of pollution and develop plans to resolve those problems. Other notable 604b work included field evaluation of the water quality of rivers and streams as part of the third and fourth year's rotational basin assessment and preparation of this edition of the 305b Water Quality Assessment Report.

Other Federal Sources - Federal FY1999, 2000 and 2001 Environmental Quality Incentive Program funds ($0.94 million, $0.92 million and $1 million, respectively) administered by the US Department of Agriculture (USDA) were directed as cost sharing assistance to approximately 130 farms throughout Vermont for nonpoint source pollution control and the installation of agricultural conservation practices. In the majority of cases, these USDA funds were combined with private funds from participating landowners.

Lake Champlain Management - The Lake Champlain Management Conference (currently known as the Lake Champlain Steering Committee) in its October 1996 *Opportunities for Action* plan has recommended three priorities for action to improve the water quality of Lake Champlain. The priorities are: reduce phosphorus pollution; prevent pollution from toxic substances; and manage nuisance nonnative aquatic plants and animals. Steady progress has been reported in the reduction of both point and nonpoint sources of phosphorus, and remediation of sediment-bound contaminants. A comprehensive basin-wide non-native species management plan was approved by the National Aquatic Nuisance Species Task Force in May 2000. Vermont has received funding from the US Fish and Wildlife Service for two years to implement priority action items in the plan. Also in the year 2000, the Lake Champlain Basin Program issued a report concerning an evaluation of progress towards phosphorus reduction goals. In 2001, the Lake Champlain Basin Program prepared and sought comment on a draft update to its 1996 Plan noted above.

Agriculture - Vermont's Accepted Agricultural Practices (AAPs) rules became effective in June 1995. The AAPs are basic practices that all farm operators are expected to follow without financial assistance to reduce agricultural nonpoint pollutant discharges. Voluntary Best Management Practices (BMP) were adopted and became effective as rules in January 1996. BMPs are site-specific practices prescribed to correct a problem on a specific farm. In 1995, the Vermont Legislature created a state financial assistance program to help pay for voluntary construction of farm improvements designed to abate NPS waste discharges. Since the state BMP cost share program began in 1996, approximately $3.9 million in state funds have been committed to build 947 BMP projects on about 449 farms. About 570 BMP projects (60%) involved manure storage or barnyard treatment.

During the 305b reporting period, permitting rules were adopted which affect Large Farm Operations (LFO). Since LFO rule adoption, LFO permits have been issued for 13 farming operations involving over 18,000 animal units. It has been estimated by the DAF&M there are approximately 30 farms existing in Vermont that qualify as an LFO.

Storm Water - Storm Water General Permit Rules were approved and became effective in October 1991. The Storm Water Procedures were officially adopted in December 1997. During the 1999-2000 Vermont legislative session, Act 114 was passed into law. This action served to substantially modify Title 10 VSA Section 1264 which describes the management of storm water within Vermont. Act 114 required the Department of Environmental Conservation to develop an enhanced storm water management program. A report was issued by the Department in February 2001 that outlined the policy and program options being considered. While the enhanced program has not been completely finalized at the time of this writing, elements of the improved and proposed program include creating municipally-based storm water utilities, certification/privatization of certain aspects of the storm water permitting process and use of improved storm water control measures. The centerpiece of the enhanced storm water program will be reflected in the "Vermont Storm Water Management Manual."

Flow Alteration/Regulation - Efforts to protect natural flows in Vermont's rivers and streams are ongoing. Hydroelectric facilities and water withdrawals for snowmaking and other purposes are the major causes of flow regulation. Most improvements are accomplished through application of Clean Water Act Section 401 water quality certification authority. Unlike earlier versions of the Vermont Water Quality Standards, the current standards, which became effective on July 2, 2000, contain hydrologic criteria.

Since the early 1980s, the Agency of Natural Resources (ANR) has had an active program to address flow regulation and other issues as part of the Federal Energy Regulatory Commission (FERC) hydroelectric licensing process. Two projects were certified since June 2000. One of the certified projects, the Weybridge Project, has also received a license from FERC, improving stream flows in approximately 2.5 miles of Otter Creek.

During the reporting period, ANR worked with the New Hampshire Department of Environmental Services (NHDES) to develop a water quality certification for the Fifteen Mile Falls Project on the Connecticut River. This certification, which was issued by NHDES, contains conditions that will benefit many miles of the Connecticut River between Gilman and Wells River, Vermont. A FERC license for the project is expected in the near future.

Work continues to resolve issues at five FERC-licensed projects with pending water quality certification applications: Carver Falls, Silver Lake, Lamoille, Waterbury and Clyde River. Plans call for certifications to be issued on these projects during 2002.

In addition to work on federally regulated projects, ANR is addressing flow and water level management issues at one of the 18 hydroelectric projects that are not licensed by the federal government (West Danville). In these cases, the Agency is using its authority under state statutes.

With respect to water withdrawals, the Agency has focused most of its effort on snowmaking water withdrawals at ski resorts. Of 19 Vermont ski resorts with snowmaking, nine are either in compliance or are scheduled to come into compliance with Water Quality Standards and in

accordance with ANR rules adopted in February 1996. Other water withdrawals, such as those for public water supplies and industrial or agricultural uses, are not subject to active programs at this time.

Dams - ANR is working with other state and federal agencies and NGOs to address the impacts of dams on the state's rivers. Late in 2000, these parties formed the Vermont Dam Task Force to provide a forum for discussion of specific dam removal/modification projects as well as policy issues related to dams, their environmental impacts, and public safety. Several dam removal projects are in their early stages and the task force members continue work on regulatory, funding and other issues.

River Restoration & Protection - Flash floods in many parts of Vermont during the last several years have caused considerable property damage and left many rivers and streams devoid of natural fish and wildlife habitat. In addition to these natural causes, habitat losses have also occurred following human-caused encroachments. Collectively, these events and their consequences have also left the affected river and adjacent areas susceptible to repeat flooding. This restoration and protection initiative, which relies on the principles and methods of fluvial geomorphology, coordinates federal, state and local resources to restore damaged streams back to their correct dimensions in order to reduce future flood damages and provide ecological and recreational values that were lost as a result of these events. While segments of the Trout River (Montgomery), the White River (Granville and Rochester), the Huntington River and West Branch of the Little River (Stowe) have been restored, many other rivers await attention.

Cost Benefit Assessment

The total expenditure of state, federal and local funds for all municipal wastewater treatment facilities and appurtenances to date has been approximately $553 million. These facilities have improved the water quality of 58 rivers and 3 lakes for swimming, fishing, boating and aquatic life. Annual operation and maintenance costs of these facilities (using 1994 costs) is approximately $69 million. The $553 million figure includes approximately $41 million in wastewater treatment appurtenances and improvements constructed during this 305b reporting period, which have further improved the water quality of nine rivers and one lake.

The amount of funding expended on nonpoint source (NPS) control of pollutants is not as easy to determine due to contributions by various state and federal agencies as well as those by landowners and volunteer watershed groups which deal with NPS pollution. Aside from several federal and state cost sharing programs to assist with planning and implementation of NPS reduction from agricultural sources, there are two federal Clean Water Act programs under DEC administration that address NPS pollution control - the Section 604b Pass Through program and the Section 319 program. Funding for the two programs amounted to approximately $661,000 from 1989 through 2001 (604b) and over $11 million from 1990 through 2000 (Section 319).

Special State Concerns and Recommendations

Several primary water quality concerns to the State of Vermont have been identified. The Department believes these topical areas, presented below in unranked order, deserve special targeting of resources either for protection or restoration. The reader is referred to Part 2, Chapter 5 appearing later in this report for further discussion of these concerns.

On-site wastewater disposal
Watershed and basin planning
Stormwater management
Gaging stations
Water quality monitoring strategy
305b assessment methodology
Groundwater
Polluting discharges from large farms
Road runoff to waterbodies
Lack of statewide vegetated buffer requirements
Atmospheric deposition of pollutants
Hydrologic modification to lakes & rivers
Exotic aquatic species as pollutants
Eutrophication of Vermont lakes
Nutrient criteria

Current Surface Water Quality Monitoring Program

Overview - Surface water quality monitoring undertaken by the Department during the 305b reporting period continued to support an assortment of water program activities. Long-term monitoring programs are designed to assess trends in water quality, as well as to generate baseline water quality information. The Department also maintains a strong presence on Lake Champlain and conducts a variety of short-term lake and stream-specific monitoring projects. Monitoring data is used to manage and protect Vermont waters in a pro-active manner. The reader is referred to Part III, Chapter 1 of this report for a more detailed description of DEC's surface water quality monitoring program.

Rotational Watershed Assessment - Vermont's rotational watershed water quality assessment process began in the spring of 1997. Two rounds of assessments have been completed and the third is underway. Assessment round 1 included the Otter Creek (Basin #3), Lower Lake Champlain Direct (Basin #4) and the White River (Basin #9). Assessment round 2 included the Poultney, Mettawee (Basin #2), the Lamoille River (Basin #7), Ottauquechee, Black (Basin #10), and the Stevens, Wells, Waits, Ompompanoosuc (Basin #14). Assessment round 3 included the Battenkill, Walloomsuc, Hoosic Rivers (Basin #1), the West, Williams and Saxtons

Rivers (Basin #11), the Deerfield River (Basin #12), and the Lower Connecticut River Basin (Basin #13).[2]

To date, the Department has completed an assessment report for seven river basins (Basin #2, 3, 7, 9, 10, 11, and 14). The Department can provide a copy of each completed assessment report upon request.

Plan for Achieving Comprehensive Assessments

The rotational watershed assessment process described above and in Part III of this report will help Vermont achieve a more comprehensive assessment every five years.

Assessment Methodology

River and stream and lakes and ponds data was updated and incorporated into the database for this report. Included in the database is information from the rotational watershed water quality assessments. This information consists of monitored and evaluated water quality data, best professional judgement from biologists and information from numerous agencies, offices and volunteer groups.

Most of the water quality information for rivers and streams was based on evaluated information. The remainder of the river and stream information was based on data obtained through monitoring, primarily from the Ambient Biomonitoring Network. Water quality information for wetlands was not determined because data were not available. With respect to lakes and ponds water quality information, most of the assessed inland lakes and all of Lake Champlain were monitored. The remainder of the lakes and ponds information was based on evaluated information.

In response to the growing requirement that data used in support of Section 303d listing[3] be of very rigorous standards, the Department has made modifications to the guidelines it uses to make use support decisions for surface waters. In conjunction with an effort led by New England Interstate Water pollution Control Commission (NEIWPCC) to create uniform New England 305b decision-making methods, Vermont has adopted a set of guidelines which are slightly more stringent than those used previously. This has resulted in minor reductions in acreages and miles previously identified as partially or not supporting uses based on data or information of insufficient quality. The following representative figure illustrates Vermont's assessment for surface waters and correspondence to state and federal water quality-based listings.

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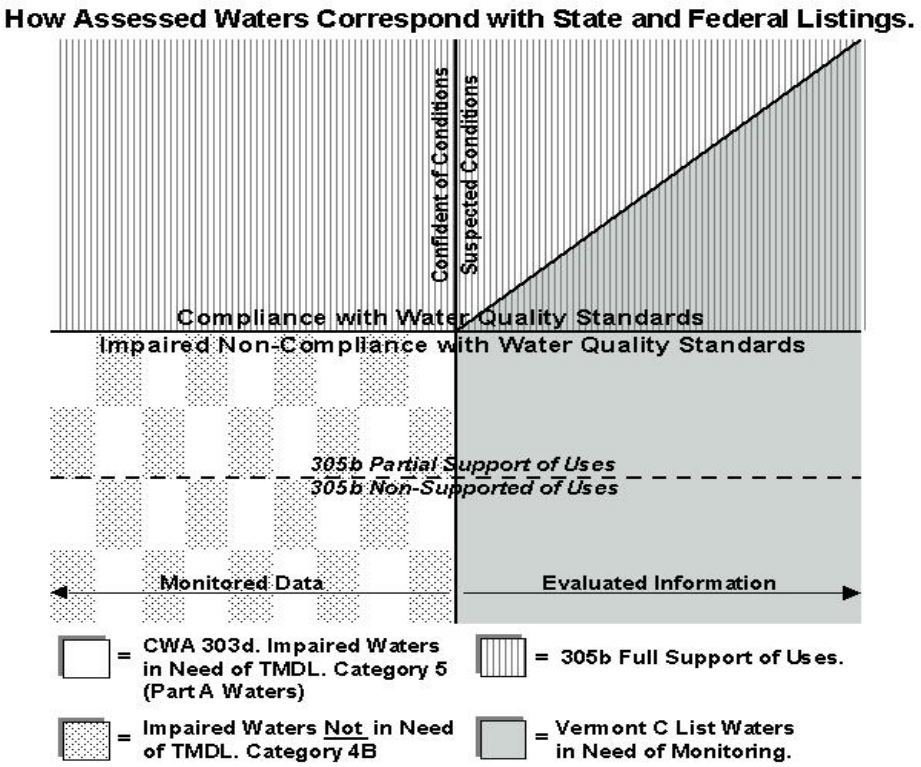
[2] As of this report date, assessment rounds 4 and 5 have not been initiated. Round 4 will involve basin #5 (upper Lake Champlain direct drainages), basin #6 (Missisquoi River) and basin #17 (Lake Memphremagog drainages). Round 5 will involve basin #8 (Winooski River), basin #15 (Passumpsic River) and basin #16 (upper Connecticut River drainages).

[3] Section 303d of the Clean Water Act requires each state to identify those waters for which technology-based pollution controls are not stringent enough to attain or maintain compliance with applicable State water quality standards.



Section 303d Waters

The Vermont Year 2000 List of Waters, submitted in conjunction with Section 303d reporting (finalized in July 2000), was approved by the regional office of the US Environmental Protection Agency in May 2001. The Vermont Year 2000 List of Waters contains two sections. Part A identifies 126 impaired surface waterbodies and 203 unique water quality impairment problems, which need pollution abatement. Although each Part A listing entry has been scheduled for possible total maximum daily load (TMDL) development, it is recognized that such an approach may not be warranted in every case. Part B is used to identify candidate waters for "de-listing." There were no waters proposed for "de-listing" on Part B of the Year 2000 List of Waters.

As of this report date, the Department has begun to prepare the Year 2002 303d List of Waters. The Year 2002 listing will be assembled in a similar two-part format (Part A & Part B) as described above. Part B of the Year 2002 will identify candidate waters for 303d de-listing and include waters that are no longer considered to be impaired and impaired waters that do not need or require a TMDL. The Year 2002 listing will also identify impaired waters being addressed under an EPA-approved TMDL. The final Vermont Year 2002 listing, eventually to be submitted to the New England regional office of US EPA for approval, will be made available separately.

TMDL Program

A TMDL, also known as a Total Maximum Daily Load, is the calculation of the maximum amount of a pollutant that a waterbody can receive and still meet applicable water quality standards. In a broader sense, a TMDL is a plan that identifies the pollutant reductions a waterbody needs to meet Vermont's Water Quality Standards and develops a means to implement those reductions. TMDLs are meant to analyze water pollution problems from a watershed perspective and develop a balance among pollution sources where the needed pollution reductions will occur.

During the reporting period, several TMDL-related efforts were initiated or completed. TMDLs were finalized by the Department and approved by EPA for the Winooski River (Cabot) and the Black River (Ludlow). TMDL approval is pending for TMDLs developed for two streams in the vicinity of Stratton.

TMDL efforts are underway and in various stages of completion for nine segments of Lake Champlain (phosphorus), sediment affecting Allen Brook (Williston) and temperature for the Mettowee River (Pawlet). The Department is in the early stages of TMDL development which concern some forty waterbodies that are impaired from acidic (i.e. low pH) atmospheric deposition.

Rivers and Streams Water Quality Assessment (Statewide)

Including the waters assessed in the last two years, 78% of Vermont's total assessed miles (5,450 miles) fully support designated water uses and 22% do not fully support designated uses. The fish consumption use is not factored into the overall use support category because the effect of a statewide fish consumption advisory would mask the extent of other threats to Vermont's waters. Two percent of the waters do not fully support fish consumption and 98% are threatened due to the statewide advisory. The shift from partial support status to threatened status since the Year 2000 305b report is due to a change in EPA guidance. Of the 5,450 miles of rivers and streams assessed for use support, 15% (838 miles) are based on in-stream monitoring data and 85% (4,612 miles) are based on a variety of other information and information sources. As stated in the Year 2000 305b report and as is the case for the Year 2002 305b report, nonpoint sources of pollution remain the most widespread cause of water quality impairment affecting rivers and streams.

Lakes and Ponds Water Quality Assessment (Statewide)

Overall statewide use support indicates that 32,117 acres (58% of the total assessed inland lake acres of 55,447 acres) fully support all uses. Approximately 18,950 of these fully supporting acres (59%) are threatened. Approximately 29,006 acres (42% of total lake acres assessed) either partially support all uses or do not support uses.

Fish consumption uses are fully supported on only 40,732 inland lake acres (83%). This is a result of the existing Vermont Department of Health advisory against consumption of freshwater fish due to mercury contamination. If the fish consumption advisory were applied, based on the strictest interpretation of EPA guidelines as discussed above, 100% of Vermont's inland lake acres would not fully support fish consumption uses.

Rotating Basin Assessment (Specific Watersheds)
Use support status of the Lamoille River basin (Basin 7) and Basin 11 (includes the West, Williams, and Saxtons Rivers) is given in Appendix D. Also found in Appendix D are summary findings from the Nulhegan River (one drainage of Basin 16) biological assessment.

Wetlands
An analysis of wetland loss between 1990 and 1999 showed a total of 522 acres of documented wetland loss and impairment. During the same period, approximately 540 acres of wetlands were saved from loss/impairment by encouraging developers to adjust the footprints of their proposed developments to avoid wetlands.

Public Health/Aquatic Life Concerns
There were four reported public beach closures in Vermont in the two years of this reporting period. It is believed that most of the Burlington area (Lake Champlain) beach closures were due to urban runoff and faulty septic systems. The on-going and permanent closing of Blanchard Beach at Oakledge Park in Burlington due to high bacteria levels is believed to be caused by illegal sewer pipe connections to the stormwater system plus contributions from urban land surface runoff.

Fish consumption advisories continue to be in effect for lake trout, walleye and all other fish due to mercury contamination. Still in effect is the 1989 fish consumption advisory for lake trout over 25 inches in length in Lake Champlain due to PCBs.

There were no closures of drinking water supplies during the reporting period; however, there were five boil water notices issued during the period.

Ground Water
The majority of Vermont's citizens continue to depend upon ground water for drinking and other uses. Generally, the quality of Vermont's ground water is considered to be excellent, although no comprehensive studies have been completed on ground water quality to confirm that characterization due to a lack of data and resources required to gather and assess the needed data. The ground water quality assessment rating of "excellent" is based on the small number of public water supplies which have detected contamination.

The quality and quantity of Vermont's ground water is not often considered except when there is problem. Ground water problems within Vermont are most often associated with drinking water supplies and can range from localized ground water contamination to well interference which reduces well yields.

A major concern with ground water resources throughout Vermont is the public's assumption that ground water is pure and safe and that it will stay that way. This attitude is due primarily to the fact that Vermont's ground water is generally safe and plentiful and the public is not well aware of how easily the resource may become contaminated or degraded by peoples' activities.

Vermonters have recently become aware of risks to drinking water safety associated with naturally occurring geologic sources of materials known as radionuclides found in certain bedrock formations. Exposure to radionuclides (includes uranium, thorium, radium and radon) at levels exceeding health standards poses a risk to water consumers, particularly when exposure continues over a long period of time. To better understand those risks, efforts are underway to delineate those areas within Vermont that are prone to having radioactive groundwater. An important component of this three year endeavor involves an evaluation of the fate, transport and concentration of radionuclides discharged to septic systems and leaching fields and whether concentrated waste result in health hazards.